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09/508,379	06/08/2000	AVRAHAM A. LEVY	035763/0107	7437

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EXAMINER	
MOONAN, FRANCIS P	
ART UNIT	**PAPER NUMBER**
1638	13

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary	Application No. 09/508,379	Applicant(s) LEVY ET AL.	
	Examiner Francis P Moonan	Art Unit 1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) *9-11,18-21,26-31,33-36 and 45* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8, 12-17, 22-25, 32, 37-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *21/2,6,7* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Applicants election without traverse of Group I, Claims 1-8, 12-17, 22-25, 32, and 37-44 in Paper No. 11 filed on 2 January 2002 is acknowledged.

The elected Group I is drawn a method of making a miniature plant with mutation inducing treatment such that the miniature plant is selected for a desired trait, and plants or plant populations made with said method.

Claims 2, 3, 14-17, and 23-25 recite more than one invention, and are examined in the office action below to the extent that they are read on an elected Group I.

Claim Objections

Claims 2, 3, 14-17, 23, and 25 are objected to because of the following informalities: the claims are read on a nonelected Group.

Claim 2 and Claims 3 dependent theron are objected to in the recitation of the phrase "by genetic engineering" because the phrase is directed to a nonelected Group III or IV invention. Applicant is advised that deletion of the phase "by genetic engineering," on line 2 of Claim 2 would obviate this objection. Claim 14 and Claims 15-17 dependent theron are objected to in the recitation of the phrase "and a mobile DNA sequence" because the phrase is directed to a nonelected Group II invention. Applicant is advised that deletion of the phase ", and a mobile DNA sequence" on lines 7-8 of Claim 14, inserting --or--- before the term "irradiation" on line 7 of Claim 14 would obviate this objection. Claim 23 and dependent claims 22-25 are objected to in the recitation of the phrase "by genetic engineering" because the phrase is directed to a nonelected Group III or IV invention. Applicant is advised that deletion of the phase "by

genetic engineering," on line 2 of Claim 23 would obviate this objection. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 3, 6, 17, 40 and 44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 and claim 3 dependent theron are rejected as vague and confusing in the recitation of the phrase "The method of Claim 1, wherein said population of miniature plants" . The phrase is vague and confusing because two different populations of miniature plants are recited in Claim 1: a population before mutagenesis; and a population after mutagenesis. If the intended population is after mutagenesis, applicant is advised that an amendment to Claim 2 inserting --mutagenized-- before the term "miniature" on line 1 of the claim would obviate this rejection.

Claims 6, 17, 40, and 44 are indefinite for improper Markush language in the claims. See MPEP 2173.05(h). The claims lack a comma punctuation mark after the term "eggplant" recited on line 2 , and the claims each appear to lack conjugation prior to the term "apple" on line 2 (Claims 6, 40, and 44) or line 3 (Claim 17). Applicant is advised that amending the claims by insertion of --the group consisting of-- after "from" and prior to "tomato" on line 2 of the claims and insertion of --and-- before "apple" would obviate these rejections.

Claim 44 is indefinite in the recitation of "The method of Claim 43". Claim 43 is a product and not a method.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 4-8, 12, 14-17, 22-25, 37-44 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a methods with miniature *Lycopersicon esculentum* tomatoes, mutant miniature plants made with *L. esculentum*, and commercial *L. esculentum* plants made with said mutant miniature plants, does not reasonably provide enablement for any plant species or cultivar other than *L. esculentum* species. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with the claimed invention.

Claims 1, 2, 4-8, 12, 14-17, 22-25, and 37-44 are broadly drawn to methods for producing, selecting, and breeding mutant miniature plants utilizing the steps of: providing a population of miniature plants as a starting material, wherein said plant has the characteristics that it is reduced in size in comparison to a commercial plant of the same species, is capable of being crossed to a plant of the same species, and may be produced at high plant density; treating said population with a genotype-altering agent; and selecting mutant miniature plants for a desired trait (Claims 1, 2, and 4-8); and breeding those selected mutant miniature plants (Claims 37-40). Claims 12 and 41-44 are drawn to plants produced by these methods. The miniature

plant population starting materials of the method claims are interpreted to include those plants derived by the following processes: the use of growth regulators with tissue culture methods; the use of growth regulator treatments on plants grown under greenhouse or agricultural field growing conditions; the grafting of scions onto dwarfing rootstocks; the treating of plants in a fashion which would stress a plant, retard its growth, and force early flowering and maturation; the use of naturally occurring miniature plants; and the use of mutant miniature plants. The term "commercial plant" is interpreted to include those plants utilized in commercial breeding, as well as plants commercially grown for public use or sale. Claims 2 and 23 are drawn to a method wherein said mutant population of any plant as starting material is generated by induced mutation or by treatment with plant growth factors. Claims 4, 38, and 42 are drawn to any plant which produces food, fiber, or flowers as starting material. Claims 5, 6, 39, 40, and 43-44 are drawn to any plant which produce any berry-type fruit or any plant of the Solanaceae family. Applicants' definition of "berry-type" as disclosed in the instant specification for example on page 8, lines 28-30, follows the formal taxonomic definition of a berry, in which a berry is defined as a multiseeded, indehiscent fruit in which the pericarp is fleshy throughout. Claims 7-8 and 24-25 are drawn to methods utilizing chemical and radiation genotype altering agents. Claim 14 and Claims 15-17 dependent thereon are broadly drawn to a population of chemical or radiation induced mutant miniature plants.

The production or "providing" of miniature plants for all of the recited plant species, which are essential starting material for the making and/or using of the broadly claimed invention, is unpredictable.

The development of tissue culture methods to provide all of the miniature starting plants of the broadly claimed invention is unpredictable. Israeli et al (1991. Scientia Horticultureae 48:71-88) teach for example in the abstract on page 71 and page 72 lines 26-31 that an analysis of tissue culture inducing mutational methods with the berry-type producing banana fruit tree cultivars "Williams", "Grand Nain", "Nathan", "Arnon", "Shai", "Elion", and "Red", demonstrated that the cultivar "Red' was recalcitrant in the production of dwarf or miniature trees by this method and failed to produce any dwarf variants. Israeli teach on page 85, lines 20-26 that different genomes and cultivars may differ in the kind and rate of variants generated in culture, which would explain the lack of dwarf variants from the cultivar "Red". Furthermore, Israeli et al teach for example on page 85, lines 8-10 that the genetic factor determining height in the "Cavendish Group" of bananas is unstable, and therefore it is unpredictable that a stable variant may be produced by these tissue culture-derived methods for a particular selected trait. Zagaja et al (1982. pp. 37-47, In: Induced Mutations in vegetatively propagated plants II. Int. Atomic Energy Agency, Vienna) teach for example on page 40, lines 15-23 that methods utilizing tissue culture induced mutation in apple are unpredictable, because the media used for micropropagation or culture of one apple genotype does not appear to function when used in another genotype. Zagaja et al teach for example on page 46, lines 1-24 that micropropagation media must be characterized, evaluated, and developed for the specific apple genotypes utilized, and that even after three years of development, the tissue culture methods as empirically determined for specific apple genotypes were not sufficiently robust for use in an apple mutagenesis process, and required further experimentation, evaluation, and development. Tremblay et al (1999. Am. J. Bot. 86(10):1373-1381) teach for example in Table 1 on page 1374

and on page 1375, column 2, lines 5-9 that an analysis of variants produced by tissue culture derived from embryos from fiber-producing white spruce (*Picea glauca*) and black spruce (*P. mariana*) trees produced dwarf or miniature black spruce plants, but did not produce any dwarf or miniature white spruce plants, indicating that the ability to produce a miniature or dwarf spruce by this method was genotype specific.

The utilization of grafting methods to provide miniature plants is unpredictable. Fideghelli et al (1983. Ann. Dell Istittuo Sperimentale per la Frutticoltura 14:53-64) teach for example in the Abstract on page 553, and on page 554, lines 6-19 that plants serving as good dwarfing rootstocks for miniature plants are not available for all fruit tree species. Zagaja et al teach for example on page 44, lines 12-13 that the scion-dwarfing capability of apple or sour cherry miniature plant rootstocks is unpredictable. Cheng et al (1995. J. Amer. Soc. Hort. Sci. 120(2):286-291) teach for example on page 290, column 2, lines 17-23 that it is unpredictable whether a miniature citrus tree may function as a dwarfing rootstock. Cummins et al (1983. pp. 294-394, IN : Plant Breeding Reviews, Vol. 1, AVI Publishing, Westport, Conn.) teach for example on page 329, line 22 to page 330, line 12 that it is unpredictable in apples as to whether a rootstock from a miniature apple tree may function as a dwarfing rootstock. Furthermore, graft compatibility of scions to rootstocks is unpredictable. Cummins et al teach for example on page 322, line 37 and page 344, line 28 to page 345, line 13, that graft compatibility of dwarfing apple rootstocks to scions of other apple rootstocks is unpredictable.

The introgression of a miniature gene to provide a miniature plant is unpredictable, in a species which does not have a narrow genetic base. Bennett et al (1995. pp.88-99, In: Genetically Modified Foods. American Chemical Soc., Washington, D.C.) teach for example on

page 90, lines 1-33 that in the Solanaceae, that species of *Lycopersicon* other than *L. esculentum* have a broad genetic base. Hunsperger et al (1996. US Patent No. 5,523, 520) teach for example in column 3, lines 26-46, that in the Solanaceae that the introgression of a miniature plant gene in one genetic background in any plant of the same solanaceous species is unpredictable in producing a miniature plant. Hunsperger et al teach for example in column 3, lines 40-41 that a miniature plant gene identified and genetically stabilized in one cultivar of *Petunia hybrida*, a member of the Solanaceae, does not confer a miniature phenotype when introgressed into the genome of a variety of other *Petunia hybrida* cultivars. Therefore, one of skill in the art would recognize that it is unpredictable that all tomato species' genotypes could be made into miniature tomatoes by the single gene introgression of a gene that confers a miniature plant phenotype in a selected tomato genotype for every tomato species as claimed.

The development of methods in which a growth retardant is utilized to reduce a plants growth, stress a plant and force early flowering and maturation is unpredictable for providing miniature plants. Hale et al (1987. Chapter 11. pp, 171-182, In: The physiology of plants under stress. Wiley-Interscience, New York) teach for example on page 172, line 18 to page 173, line 22 the application of antitranspirant chemicals as plant growth retardants and plant growth regulators. Hale et al teach for example in Table I on page 174 that the growth retardant CCC has unpredictable side effects from one plant species to the next, and that these side effects include alterations in dry matter and increased susceptibility to death by dehydration because of decreased water usage capacity.

Applicants fail to disclose any guidance as to how barriers to sexual hybridization within species would be overcome to make and/or use the invention. For example, intraspecific barriers

to hybridization, due to multigenic pollen incompatibility, are known by those of skill in the art as occurring in many plant species, for example in species such as radishes. Applicant fails to disclose any guidance as to how to make and/or use the invention with all apomictic or asexually or clonally reproduced plants. For example sexual hybridization barriers are known by those of skill in the art as occurring for example in apomictic plant species that asexually or apomictically reproduce only via the production of bulbs. Furthermore, it is well known to those of skill in the art that many commercially grown citrus are polyembryonic plants which produce apomictic seeds strictly from nucellar tissue, and are recalcitrant to plant crossing.. Applicant fails to disclose any guidance as to how to make and/or use the invention with seedless cultivars. It is well known to those of skill in the art that many grape or tree fruit species are capable of sexual crossing, but said species also include cultivars that are seedless, and must be vegetatively propagated.

Applicants fail to disclose guidance for the essential sources of starting materials or the essential manipulation steps, procedures, and/or reagents involved in the genotypic alteration of a broadly recited population of miniature woody or berry-type producing or solanaceous plants of the claims. For example, applicant fails to disclose any specific eggplant, grape, or citrus miniature plants that are essential starting material for the claimed invention. Applicant fail to disclose guidance to any specific tissue culture strategies or materials that would be utilized for making all dwarf or miniature mutant woody plant populations, commensurate with the scope of the claims. Applicants fail to disclose any guidance as to the source of dwarfing rootstocks that would be required to provide the starting plants for all woody species, commensurate with the scope of the claims.

Given the claim breadth, the unpredictability, and lack of guidance as discussed above, undue experimentation would have been required by one of skill in the art to identify, make, and characterize a multitude of essential plant materials; to evaluate, characterize, and develop method steps to overcome barriers to sexual hybridization in all plants; to evaluate, characterize, and develop essential tissue culture methods for the making and/or using of the claimed invention with all plants; or to evaluate, characterize, and develop the specific germplasm for the making and/or using of the invention with all solanaceous species.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 7, 12, 14, 15, 22-24, 37-38, and 41-42 are rejected under 35 U.S.C. 102(b) as anticipated by Khush et al (1985. Int. Rice Comm. Newsletter 34(2):11-126).

Claims 1, 2, 4, 7, 12, 14, 15, 22-24, 37-38, and 41-42 are broadly drawn to methods for producing, selecting, and breeding mutant miniature plants utilizing the steps of: providing a population of miniature plants as a starting material, wherein said plant has the characteristics that it is reduced in size in comparison to a commercial plant of the same species, is capable of being crossed to a plant of the same species, and may be produced at high plant density; treating said population with a genotype-altering agent; and selecting mutant miniature plants for a desired trait (Claims 1, 2, 4, and 7); and breeding those selected mutant miniature plants (Claims

37-38). Claims 12 and 41-42 are drawn to plants produced by these methods. The miniature plant population starting materials of the method claims are interpreted to include those plants derived by the following processes: the use of growth regulators with tissue culture methods; the use of growth regulator treatments on plants grown under greenhouse or agricultural field growing conditions; the grafting of scions onto dwarfing rootstocks; the treating of plants in a fashion which would stress a plant, retard its growth, and force early flowering and maturation; the use of naturally occurring miniature plants; and the use of mutant miniature plants. The term "commercial plant" is interpreted to include those plants utilized in commercial breeding, as well as plants commercially grown for public use or sale. Claims 2 and 23 are drawn to a method wherein said mutant population of any plant as starting material is generated by induced mutation or by treatment with plant growth factors. Claims 4, 38, and 42 are drawn to any plant which produces food, fiber, or flowers as starting material . Claims 7 and 24 are drawn to methods utilizing chemical mutagen genotype altering agents. Claim 14 and Claim 15 dependent thereon are broadly drawn to a population of chemical-induced mutant miniature plants.

Khush et al teach on page 111, lines 37-47 that prior to 1966, rice cultivars utilized in Asia were tall, and that at higher planting densities, lodging of plants resulted such that lower planting densities were required for rice cultivation, and higher fertilization requirements were required, in comparison to the predominantly grown miniature rice plants utilized throughout Asia as of 1985.

Khush et al teach miniature plants. Khush et al teach for example on page 111, lines 43-47, and page 122, lines 18-30 the miniature rice plant IR36, and the development of the first

widely used commercial rice miniature plant, IR8, and public availability and use of IR8 beginning in 1966.

Khush et al teach the tissue culture-induced and chemical-induced mutagenesis of a mutant miniature plant, the production of mutant populations of miniature plants derived from the tissue culture, and the selection of mutant miniature rice plants for a desired trait. Khush et al teach on page 121, line 46 to page 122, line 15 the use of miniature rice plants to derive a population of genetically variant miniature rice plants, by utilizing tissue culture induced mutational processes, and the selection of miniature rice breeding lines for the desired traits of salt tolerance, cold tolerance, disease resistance, adaptation to soil type, yield, and protein and amino acid composition of grain. Khush et al teach on page 122, lines 18-30 the use of mutation breeding with the chemical mutagen EMS and the miniature rice plant IR36, the development of a population of miniature mutant IR36 plants, and the selection for desired traits.

Khush et al teach the introgression of the desired traits into commercial plants by crossing commercial plants with naturally occurring and mutant miniature plants comprising the desired traits. Khush et al teach in Table 5 on page 119, line 25 to page 119, line 27 the development of tall submergence tolerant lines by sexual crossing , from miniature and mutant miniature rice plant lines that were originally selected for desired traits. Khush et al teach for example in Table 3 on page 115, a range of miniature rice plants developed by sexual hybridization methods and breeding, including the miniature rice plant IR36. Khush et al teach on page 122, lines 18-30 the use of mutation breeding with the chemical mutagen EMS and the miniature rice plant IR36, and the development of a population of miniature mutant IR36 plants.

Khush et al teach on page 122, lines 18-30 the development of the tall variety "Siyam Halus", suitable for submergence prone lowland regions, which was derived by crossing of a tall rice plant with a mutant miniature plant selected from a population of IR36-derived miniature plant mutants.

Claims 1, 2, 4, 8, 12, 14, 15, 22, 23, 25, 37, 38, 41, and 42 are rejected under 35 U.S.C. 102(b) as anticipated by Lahiri et al (1993. Bangladesh J. Bot. 22(2):167-172).

Claim 8 dependent on Claim 1 is broadly drawn to a method utilizing mutagenesis by irradiation. Claim 25 dependent on Claim 22 is broadly drawn to a method utilizing mutagenesis by irradiation.

Lahiri et al teach miniature plants. Lahiri et al teach for example on Tables 1 and 2 on page 167 the commercially grown miniature rice plants of IR8 and BINASAIL.

Lahiri et al teach the making of populations of mutant miniature plants with gamma irradiation. Lahiri et al teach for example on page 167, line 19 to page 168, line 2; page 168, line 10 to page 169, line 12; and page 169, lines 13-39, the production of mutant populations of gamma irradiation-induced mutants each derived from the miniature rice plants of IR8 and BINASAIL.

Lahiri et al teach the selection of mutant miniature plants with a desired trait. Lahiri et al teach for example on page 168, lines 3-8, and page 171, lines 5-7 that individual plants were selected from the mutant miniature rice plant populations from each of IR8 and BINASAIL, from the group of desired traits consisting of: color and chalkiness of grains, kernel weight,

kernel length-breadth ratio, hulling recovery, yield, kernel amylose or protein content, and disease resistance.

Lahiri teach the crossing of selected mutant miniature plants with a desired trait with a commercial plant, to make a commercial plant comprising said desired trait. Lahiri et al teach for example on page 167, lines 8-12 that the new varieties of IRATOM 24, IRATOM38, B33, and BINASAIL (Mut S1) were made genetically stabilized for their desired traits by recurrent backcrossing of selected gamma irradiation mutants with their respective commercial rice cultivar parent.

Claims 1-6, 8, 12, 13, 14-17, 22, 23, 25, and 32 are rejected under 35 U.S.C. 102(b) as anticipated by Privalov et al (1991. Genetika 27(3):450-457).

Claims 3, 5, 6, and 13 are ultimately dependent on Claim 1. Claims 3 and 13 are drawn to a method for producing a population of mutant miniature tomato plants, and the resultant tomato plants. Claim 5 is drawn to a method wherein said plant of the same species is used to produce a plant of the Solanaceae or produces berry-type fruit. Claim 6 is drawn to a method wherein the plant of the same species produces a berry-type fruit of tomato, grape, prune, eggplant, citrus, or apple. Claims 16-17 are ultimately dependent on Claim 14. Claims 16 and 17 are drawn to mutant miniature plant populations wherein said commercial plant of the same species is a plant of the Solanaceae or produces berry type fruit, including the plant species of tomato, grape , prune, eggplant, citrus, or apple. Claims 32 is ultimately dependent on Claim 22. Claim 32 is drawn to a method of producing a mutant population with a miniature tomato cultivar.

Privalov et al teach a miniature tomato plant, which is a member of the Solanaceae. Privalov et al teach for example in lines 8-11 of the Summary on page 457 the miniature *Lycopersicon esculentum* plants comprising the *wilty dwarf* mutation.

Privalov et al teach the production of a population of mutant miniature tomato plants. Privalov et al teach for example in lines 8-11 of the Summary on page 457 the mutagenesis with gamma irradiation of miniature *Lycopersicon esculentum* plants comprising the *wilty dwarf* mutation, to produce a population of M1 mutagenized plants.

Privalov et al teach the selection of a mutant miniature tomato plant with a desired trait. Privalov et al teach for example in lines 8-11 of the Summary on page 457 the selection of individual M1 generation plants with the desired trait of genetically dominant reversion of the *wilty dwarf* phenotype.

Claims 1, 2, 4, 5, 12, 14-16, 22, and 23 are rejected under 35 U.S.C. 102(b) as anticipated by Damasco et al (1996. Australian J. Experimental Agriculture 36:237-41.

Damasco et al teach miniature banana plants with berry-type fruit. Damasco et al teach for example on page 237, column 2, lines 6-9 and lines 20-26 the miniature banana plants of the cultivar "Dwarf Parfitt", and miniature plant "offtypes" produced through tissue culture micropropagation of the normally tall Cavendish varieties of "Williams" and "New Guinea Cavendish".

Damasco et al teach the production of populations of mutant miniature banana plants. Damasco et al teach for example on page 237, column 1, lines 1 to column 2, line 17 that tissue culture micropropagation of banana plants cultured on media with plant growth factor chemicals

results in the induction of a wide variety of tissue culture-derived mutant banana plants, including miniature banana plants. Damasco et al teach on page 237, column 2, line 10 to page 238, column 1, line 11, the tissue culture induced mutagenesis of populations of miniature banana plants each derived from the miniature cultivar "Dwarf Parfitt", miniature "offtype" plants originally produced by micropropagation of the cultivar "Williams", and miniature "offtype" plants originally produced by micropropagation of the cultivar "New Guinea Cavendish".

Damasco et al teach the selection of mutant miniature banana plants for a desired trait, from mutant populations of banana plants. Damasco et al teach for example on page 238, line 12 to column 2, line 18 and Figures 2 and 3 on page 240 the selection of individual mutant miniature banana plants from the population of tissue culture-induced mutagenized miniature banana plants, for the desired traits of gibberellic acid responsiveness and gibberellic nonresponsiveness.

Claim Rejections - 35 USC § 102/103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12, 13, and 41-44 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over each of Scott et al (1995. Hortscience

30(3) :643-644), Bishop et al (1996. The Plant Cell 8:959-969), and Scott et al (1984. HortScience 19(6):874-876).

The claims are drawn to mutant miniature tomatoes, solanaceous plants, or other berry-bearing plants, produced by a particular method, and the products of crosses of these plants with commercial cultivars.

Scott et al (1984) teach for example on page 875, column 2, lines 4-7 the miniature *Lycopersicon esculentum* tomato plant cultivar "Tiny Tim", which has the characteristics that it is determinate in growth habit, produces tomato fruits of cherry tomato-size with a fruit mass of 15-25 grams, and is nonparthenocarpic. Scott et al (1984) teach for example in the Abstract on page 874 the commercial tomato cultivar "Severianin", and its ability to be crossed with another tomato plant of the same species, including Micro-Tom. Micro-Tom has desired traits, which include a miniature growth habit.

Bishop et al teach for example on page 959, column 1, lines 12-33 a variety of miniature *Lycopersicon esculentum* plant lines and cultivars comprising the d or d_x alleles. Bishop et al on page 959, column 1, lines 12-18 teach that the miniature tomato plant cultivars of "Tiny Time", "Tom Thumb", and "Dwarf Stone" have been known and publicly available from as early as 1959, and that the miniature tomato plant cultivar "Dwarf Champion" has been known and publicly available as early as 1901, and a variety of miniature tomato plant lines have been made and characterized by various people from 1901 to 1996. Bishop et al teach for example, that said miniature tomato plants comprising the d or d_x alleles may be crossed with other *L. esculentum* cultivars.

Scott et al (1995) teach for example on page 643, lines 1-31 the miniature *Lycopersicon esculentum* tomato cultivars “Micro-Gold”, “Micro-Tom”, “Florida Petite” and “Florida basket”, and the miniature tomato breeding lines of “Fla. 7188” and “874379-1”.

The tomato plants taught by Scott et al (1984), Scott et al (1995), and Bishop et al differ from the broadly claimed plants only in their derivation by a different breeding or natural selection process. However, the process of obtaining mutant miniature tomatoes would not confer a unique characteristic to the resultant tomato plants. See *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), which teaches that a product-by process claim may be properly rejected over prior art teaching the same product produced by a different process, if the process of making the product fails to distinguish the products.

Claims 12 and 41-44 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Fideghelli et al (1983. Ann. Dell Istittuo Sperimentale per la Frutticoltura 14:53-64) .

Fideghelli et al teach a variety of commercially grown trees capable of sexual hybridization within their species, which produce berry-type fruit. Fideghelli teach for example for example in Tables 5 on page 58 the commercially grown plum cultivars of “Stanley”, “President”, and “Frontier”, and their ability to be crossed within their own species. Fideghelli et al teach for example in Table 4 on page 58 the commercially grown apricot cultivars of “Ablate”, and “Precoce Cremonini”, and their ability to be crossed within their own species. Fideghelli et al teach for example in Table 6 on page 59 the commercially grown pear cultivars of “Nain Vert”, “Max Red Bartlett”, and “President Drouard”, and their ability to be crossed within their

own species. Fideghelli et al teach for example in Tables 10 on page 61 the commercially grown peach cultivars of "J.H. Hale", and "Bonanza", and their ability to be crossed within their own species.

The berry-bearing plants taught by Fideghelli et al differ from the broadly claimed plants only in their derivation by a different breeding or natural selection process. However, the process of obtaining miniature berry-bearing plants would not confer a unique characteristic to the resultant berry-bearing plants. See *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), which teaches that a product-by process claim may be properly rejected over prior art teaching the same product produced by a different process, if the process of making the product fails to distinguish the products.

Claims 1, 2, 4-8, 12, 14-17, 22-25, and 37-44 are rejected under 35 U.S.C. 103(a) as obvious over Khush et al in view of Fideghelli et al.

Claims 39-40 are ultimately dependent on Claim 37. Claims 39 and 40 are methods for producing a mutant population of a commercial plant with a desired trait, wherein said commercial plant is a member of the Solanaceae or produces a berry-type fruit, including the berry-type fruits of tomato, grape, prune, eggplant, citrus, or apple. A prune is interpreted as a dried plum. Claim 39 dependent on claim 37 is a method for producing a mutant population of a commercial plant with a desired trait, wherein said commercial plant is a member of the Solanaceae or produces a berry-type fruit. Claim 40 dependent on Claim 39 is a method with a commercial plant that produces a berry-type fruit of tomato, grape, prune, eggplant, citrus, or apple.

Fideghelli et al suggest for example in lines 10-12 of the abstract on page 53, and on page 54, lines 16-19 that breeding should be directed toward the development of miniature or dwarf trees in order to produce high density planting orchards of fruit trees.

It would have been obvious for one of ordinary skill in the art to combine the teachings of the methods of Khush et al , and the miniature fruit trees and bud mutagenesis procedures of Fideghelli et al, with the chemical and irradiation mutagens taught by each reference, as suggested by each reference, to make and/or use the claimed mutant miniature plant populations, mutant miniature plant lines, commercial plants derived from miniature mutant plant lines, and the methods of making said plants. It would have been an obvious design choice for one of skill in the art to make the claimed invention with the alternate mutagenesis treatment steps of: bud treatment with a chemical-based mutagen such as EMS, MMS, MNU, or bleomyocin; bud treatment with X-Ray, or UV, or gamma ray irradiation; or bud treatment by fast neutron bombardment.

Claims 1-8, 12-17, 22-25, 32, and 37-44 are rejected under 35 U.S.C. 103(a) as obvious over Khush et al in view of Scott et al (1989).

Khush et al teach the plants, methods, and motivation to make the miniature plant invention, as discussed in the 35 U.S.C. 103(a) rejection above.

Khush et al do not teach a miniature plant of : a tomato, a member of the Solanaceae, or a plant with a berry-type of fruit.

Scott et al (1989) teach miniature tomato plants, which have berry types of fruit and are members of the Solanaceae. Scott et al (1989) teach for example in Figure 1 on page 2 and on

page 1, lines 1-21 the miniature *Lycopersicon esculentum* tomato cultivar "Micro-Tom" and its miniature tomato parent "Florida Basket".

It would have been obvious for one of ordinary skill in the art to combine the methods taught by Khush et al with the miniature tomato plants taught by Scott et al 1989, as suggested by Khush et al, to make and/or use the claimed mutant miniature tomato populations, mutant miniature tomato plant lines, the commercial tomato plants derived from miniature said mutant plant lines, and the methods of making said tomato plants. It would have been an obvious design choice for one of skill in the art to make the claimed invention with the alternate mutagenesis treatment steps of: tomato treatment with a chemical-based mutagen such as EMS, MMS, MNU, or bleomyocin; tomato treatment with X-Ray, or UV, or gamma ray irradiation; or tomato treatment by fast neutron bombardment.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Francis Moonan, whose telephone number is (703) 605-1201. The examiner can normally be reached on Monday through Friday 9:00 AM to 5:00 PM (E.S.T.)

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson, can be reached at (703) 306-3218. The fax phone number for this

Khush et al teach miniature plants, for example on page 111, lines 43-47, and page 122, lines 18-30. Khush et al teach on page 121, line 46 to page 122, line 15; on page 121, line 46 to page 122, line 15; and on page 122, lines 18-30; the tissue culture-induced and chemical-induced mutagenesis of a mutant miniature plant, the production of mutant populations of miniature plants derived from the tissue culture, and the selection of mutant miniature plants for a desired trait. Khush et al teach for example in Table 5 on page 119, line 25 to page 119, line 27; Table 3 on page 115; on page 122, lines 18-30; and on page 122, lines 18-30, the introgression of the desired traits into commercial plants by crossing commercial plants with naturally occurring and mutant miniature plants comprising the desired traits.

Khush et al teach the motivation to breed for desired traits first in a miniature plant, then transferring desired traits into commercial cultivars. Khush et al suggest on page 111, lines 47-51 that breeding efforts be directed toward the development of miniature plants because they could be grown at higher planting density. Khush et al further suggest for example on page 118, line 1 to page 119, line 25, that desired traits developed in a miniature plant cultivars by plant crossing or mutation breeding, may be introgressed into commercial germplasm to make new commercial cultivars.

Khush et al do not teach a miniature plant with a berry-type of fruit.

Fideghelli et al teach miniature trees that produce berry type fruit, including: apricots, sweet cherries, nectarines, apples, pears and plums. Fideghelli et al teach for example in lines 1-8 of the abstract on page 53 the breeding of genetic dwarf cultivars both by cross pollination and gamma irradiation of apricots, sweet cherries, peaches, nectarines, apples, pears, and European and Japanese plums by gamma irradiation mutagenesis of tree buds.

Group is (703) 308-4315. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Francis Moonan, Ph. D.
6 February 2002

DAVID T. FOX
PRIMARY EXAMINER
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